AUTOMOBILE PART SHIPPING SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

None

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

Not applicable.

BACKGROUND OF THE INVENTION

The present invention relates generally to packaging container systems for shipping breakable and other articles and more particularly to a packaging container system for shipping automobile window glass and other automobile parts and assemblies.

The safe shipping of automobile glass products (*e.g.*, front windows, rear windows, side window, *etc.*) from the glass manufacturer to the automobile assembly plant presents particular difficulty, especially for large curved glass products. All parties—glass manufacturer, shipper, automobile assembler—accept breakage of a significant percentage of such large glass products. These same comments apply to other automobile parts, such as, for example, hoods, fenders, doors, and the like. Shipment without damage is difficult to achieve. Prior attempts to package automobile glass and other products have proven futile.

U.S. Patent No. 5,836,448 proposes a rigid surface having a layer of foam bonded thereto with an adhesive coating the foam. The china or other item to be shipped is adhesively held in place. U.S. Patent No. 4,287,990 proposes to sandwich glass sheet inside a male/female waffle foam carrier pair and to secure the waffle foam panels together. U.S. Patent No. 5,101,976 proposes to ship automobile glass and metal parts held in place by a U-shaped channels disposed atop and on the bottom of an elongate rigid body member. U.S. Patent No. 4,225,043 proposes to ship automobile glass secured by slotted foam blocks. U.S. Patent No. 4,353,466 proposes to ship automobile glass in adhesively coated notched logs, where the upstanding glass sheets rest in the notches. U.S. Patent No. 5,644,898 proposes to apply a liquid between automobile glass wherein the liquid cools to elastomeric spacers between the glass. U.S. Patent No. 4,182,450 proposes to pack automobile glass between slotted brackets and place the assembly inside packing containers.

Despite these proposals, there exists a real need in the automobile industry for shipping container systems of small overall size, which afford improved protection for the parts being shipped. It is to such need that the present invention is addressed.

BRIEF SUMMARY OF THE INVENTION

Method for shipping an automobile part, which commences with laminating plies of paperboard for forming a paperboard laminate having a front and a back. The automobile part is placed on the front of said paperboard laminate leaving exposed some front areas of the paperboard laminate. The automobile part product and the exposed areas of the paperboard laminate are shrink-wrapped with plastic shrink-wrap material.

A packaging system for shipping of a glass product includes laminated plies of paperboard, which form a paperboard laminate having a front and a back. Some of the front side plies of the paperboard laminate have been cut out to form a cavity in the configuration of the glass product being packaged. The glass product is disposed in the cavity and is shrink-wrapped therein with plastic shrink-wrap material. Advantageously, a foam block is attached to the front side and backside of the shrink-wrapped glass product and the entire structure is placed inside a shipping carton for safe shipment.

The corresponding method for packing glass in a packaging system, which commences with laminating plies of paperboard to form a paperboard laminate having a front and a back. A glass product conforming reinforcing block is affixed to the back of the paperboard laminate. Some of the front side said plies of said paperboard laminate are cut out to form a cavity in the configuration of a glass product. The glass product is placed in the cavity and is shrunk-wrapped with plastic shrink-wrap material therein. Advantageously, a foam block is attached to the front side and backside of the shrink-wrapped glass product and the entire structure is placed inside a shipping carton for safe shipment.

Method for packing a metal or composite automobile part in a packaging system commences with laminating plies of paperboard to form a paperboard laminate having a front and a back, and foldable ends. An automobile part is placed on the front of the paperboard laminate leaving a balance of the front exposed. The balance of the front exposed paperboard laminate and the automobile part product are shrink-wrapped with plastic shrink-wrap material. The laminated foldable ends are folded

upwardly to form a carton bottom having an open top and the shrink-wrapped automobile part disposed therein. A lid then is placed over the cavity.

For present purposes "paperboard" is corrugated paper, an oft-used product in the shipping container and carton industry.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and advantages of the present invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of the paperboard laminate with inserted automobile window glass with the sides of the laminate being in an unfolded condition;

Fig. 2 is a side view of the paperboard laminate of claim 1 with the ends being folded inward and the entire laminate structure placed inside a shipping carton;

Fig. 3 is a cross-sectional view taken along line 3-3 of Fig. 2;

Fig. 4 is a perspective view of the paperboard laminate/automobile window glass assembly of Fig.1 with its component parts sequenced for assembly;

Fig. 5 is a front elevational view of the machine that shrink-wraps the automobile window glass to the paperboard laminate in the machine's first step;

Fig. 6 is the machine is of Fig. 5 with the upper suction cup plate lowered to pick up the shrink-wrap plastic material;

Fig. 7 is the machine of Fig.5 with the upper suction cup plate in its upper position in the heating mode wherein the shrink-wrap plastic material stretches and sags as it is heated;

Fig. 8 is the machine of Fig. 5 with the heated shrink-wrap plastic material being lowered by the upper suction cup plate onto the automobile glass/paperboard laminate assembly;

Fig. 9 is the machine of Fig. 5 with the upper suction plate returned to its upper position and a vacuum being pulled to laminate the shrink-wrap to the automobile glass/paperboard laminate assembly;

Fig. 10 is a perspective view of another embodiment of the present invention wherein an automobile door is laminated to a paperboard box with shrink-wrap material; and

Fig. 11 is a perspective view of the paperboard container/automobile door glass assembly of Fig. 10 with its component parts sequenced for assembly.

The drawings will be described in more detail below.

DETAILED DESCRIPTION OF THE INVENTION

Laminate structures provide greater strength than solid structures of the same thickness. In the present invention, such greater strength is but one consideration in opting for use of a laminate structure. Of similar importance is the prevention of the object being shipped from moving, shifting, or otherwise changing position during loading, shipping, and storage of the object. Smaller objects, even delicate and breakable objects, are easier to pack for shipment because of their small size. When the object is large and heavy, such as an automobile structural part, proper packing for its safe shipment is anything but routine. Even "unbreakable" structural automobile parts, such as hoods, fenders, and doors, can become scratched, dented, and abraded to the point that rework of the part is needed. When the structural automobile parts are breakable and non-planar, such as automobile windshield glass, the packing problems become even more compounded. Now, the packer must be attentive to scratching, abrading, breaking, and stress, of a part that can weigh upwards to several hundred pounds. A daunting task for the part manufacturer and shipper indeed.

Referring initially to Fig. 1, a paperboard laminate/automobile window glass laminate assembly, **10**, is seen in perspective view to be composed of a paperboard laminate assembly, **12**, and a piece of automobile window glass, **14**. A cavity formed in the front or topside of paperboard laminate assembly **12** matches the outer configuration of automobile window glass **14**, which fits snugly therein. The ends of paperboard laminate assembly **12**, **16** and **18**, are seen to be bi-folded. Overlaying the front side of topside of paperboard laminate assembly **12,** automobile window glass **14**, and bi-fold laminate ends **16** and **18**, is a sheet of plastic shrink-wrap material, **20**, which has been heat/vacuum bonded thereto to produce a laminate structure.

While paperboard laminate assembly **12** could be made from a single piece of corrugate sheet of equivalent thickness, the preferred laminate structure is stronger. Also, the laminate construction permits plies of paperboard sheet to be removed for forming the cavity adapted to receive window glass **14**. In this regard, paperboard

laminate assembly **12** could be manufactured from plies already containing die cuts and then laminated, or the solid laminate plies can be joined (*e.g.*, by an adhesive, such as a hot melt adhesive) and then the plies die cut form forming the cavity. Either technique is suitable for present purposes.

Bi-fold laminate ends **16** and **18** and folded upwardly so as to pinch or crimp the ends of window glass **14**, such as is seen in Figs. 2 and 3, and paperboard laminate/automobile window glass laminate assembly **10** is placed inside a shipping carton formed from a lid, **22**, and a base, **24**. Such pinching/crimping of the ends of window glass **14** further prevents it from becoming dislodged or moved during the shipping operation. A pair of foam blocks, **26** and **28**, are placed on either side of automobile window glass **14**, to protect glass **14** should top **22** or base **24** become crushed during handling and shipping operations.

Referring to Fig. 4, shown are the components of paperboard laminate/automobile window glass laminate assembly **10** in the arrangement for their assembly, *viz.*, plastic shrink-wrap sheet **20**, window glass **14**, and paperboard laminate assembly **12**. During the shrink-wrap operation, it was determined that window glass **14** was subject to breakage due to the stress placed on it and its curved shaped. Backing block **30** was found to prevent such breakage due to its upper surface having the same (convex) shape as window glass **14**'s lower (concave) shape. Of course, window glass **14** could be flipped around so that its convex surface is facing down, which would necessitate the upper surface of backing block **30** being concave in shape. So long as the upper surface of backing block **30** mates with the lower surface of window glass **14**, a suitable arrangement has been made. Should window glass **14** be planar, backing block **30** no longer would be required, as the lower platen of the shrink-wrap machine would provide the necessary backing for window glass **14** during the shrink-wrapping operation.

Figs. 5-9 depict shrink-wrap machine **32**, which takes the assembly depicted in Fig. 4 and effects the production of paperboard laminate/automobile window glass laminate assembly **10**, and the various manufacturing steps that machine **32** executes. Commencing with Fig. 5, a vacuum chamber, **34**, is seen to include a control panel, **36**. Vacuum chamber **34** supports a lower foraminous platen, **38**, upon which an end, **40**, of a roll of shrink-wrap plastic, **42**, rests. An overhead superstructure, **44**, supports an overhead hydraulically driven platen, **46**, whose lower surface bears a plurality of suction cups, a suction cup, **48**, being label as

illustrative thereof. Platen **46** also generates heat, preferably by electrical resistance, though other heating means certainly can be used.

In the first step of the operation as shown in Fig. 5, shrink-wrap end **40** is placed atop foraminous platen **38**. In the second step of the operation as shown in Fig. 6, platen **46** is lowered for its suction cups to be pressed against end **40**. Platen **46** then is raised and heating commenced. Such heating softens end 40 causing it to stretch, as can be seen by the sagged dotted line in Fig. 7. In fact, an experienced machine operator can tell if end **40** has been sufficiently heated by the amount of sag.

Next, the assembly of Fig. 4 is placed atop lower foraminous platen **38** and heated end **40** is draped thereover by lowering platen **46**, as shown in Fig. 8. At that time platen **46** is raised and, as shown in Fig. 9, vacuum is applied by vacuum chamber **34** which causes heated end **40** to bond tightly to window glass **14** and ends **16** and **18** of paperboard laminate assembly **12**. Cooling of end **40** causes window glass **14** and ends **16** and **18** of paperboard laminate assembly **12** to be placed under tension by shrink-wrap end **40** and tight bond is formed. The resulting product is paperboard laminate/automobile window glass laminate assembly **10** of Fig. 1. Shrink-wrap end **40** can be cut and laminate assembly **10** removed from machine **32** and the process repeated.

When the automobile part is a metal and/or composite part (hood, fender, door panel), the extra precaution of the cavity in the paperboard laminate need not be taken. Rather than breaking, such metal and/or composite parts need protection from scrapes, abrasions, scratches, dents, and the like. Such protection is afforded by the same shrink-wrapping technique sans the cavity.

Referring initially to Fig. 10, a door, **50**, can be seen disposed in a carton bottom, **52**. Door **50** will be seen to be shrink-wrapped to carton **52**. Also, the upstanding sides of carton **52** also are seen to be shrink-wrapped. A lid, like lid **22** (see Fig. 2) can be placed over the open upper cavity for shipment of door **50**.

The formation of the unique packaging system of Fig. 10 is seen by referring to Fig. 11. Shrink-wrap material, **66**, is seen to be located above door **50**, which in turn is seen to be located above a paperboard sheet, **54**. Paperboard sheet **54** has four ends or edge pieces, **56**, **58**, **60**, and **62**. Folding sides **56**, **58**, **60**, and **62** upwardly forms the sides of carton **52**. Door **50** is placed on the central flat section, **64**, of paperboard sheet **54**.

The assembly shown in Fig. 10 can be formed using shrink-wrap machine **32** by using the same process described in connection with Figs. 5-9. The only difference is that the inside of door panel **50** is substantially flat and unbreakable, so that a backing block (*e.g.*, backing block **30**) is not needed. Rather, foraminous platen 38 serves adequately as a backing block during the shrink-wrapping operation. The ruggedness and durability of door **50** also permits it to be packaged directly by simply folding sides **56**, **58**, **60**, and **62** upwardly and securing them by means of hot melt adhesive, tape, or the like, to form a carton with an open top. The shipper then need only place and secure a lid thereto to produce a unique packaging system that minimizes, if not eliminates, door panel **50** from becoming scratched, dented, or otherwise abraded during the shipping operation. Also, a very compact, light-weight shipping system yields such safe shipping of large automobile parts.

Shrink-wrap material preferably is heat-shrinkable plastic film (*e.g.*, polyolefins, such as, polyethylene, polypropylene, polyesters, PVC, polyvinylidene chloride, polystyrene) that shrinks upon heating to place an object under tension. Alternatively, it may be stretch wrap film that has long-term elastic memory with great stretch (*e.g.*, up to 300%, and desirably, about 100% to 250%, such as a cast extruded multi-layered stretched polyethylene film) so that it can place sufficient tension on the automobile glass product or other part to secure it for safe shipment.

While the invention has been described with reference to a preferred embodiment, those skilled in the art will understand that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims. In this application all units are in the metric system and all amounts and percentages are by weight, unless otherwise expressly indicated. Also, all citations referred herein are expressly incorporated herein by reference.